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17 October 1960

THE INDICATIONS FOR SURGICAL TREATMENT OF  
MITRAL-AORTIC STENOSES

By G. M. Solov'yev

- USSR -

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THE INDICATIONS FOR SURGICAL TREATMENT OF  
MITRAL-AORTIC STENOSES

Following is the translation of an article by G.M. Solov'yev entitled "O Pokazaniyakh k Khirurgicheskomu Lecheniyu Mitral'no-Aortal'nykh Stenozov" (English version above) in Terapevticheskiy Arkhiv (Therapeutic Archives), Vol. 32, No. 5, Moscow 1960, pages 47-53.]

From the hospital surgical clinic (director-Professor B.V. Petrovskiy, Active Member of the Academy of Medical Sciences USSR) of the First Moscow Order of Lenin Medical Institute imeni I.M. Sechenov.

There is no agreement on the matter of the indications for mitral commissurotomy in the case of combined rheumatic valve defects of the heart with a pronounced mitral stenosis. In the opinion of a number of authors (Kohler, S.A. Gadzhiyev), the combination of mitral stenosis with an aortic valve defect is a contraindication to mitral commissurotomy. However, such combinations are most frequent in the case of combined cardiac valve defects. Therefore, the problem of the permissibility of mitral commissurotomy in such combined valve defects is an actual one. The chief grounds for not performing a mitral commissurotomy are constituted by the considerable overload of the left ventricle, which leads to

an acute insufficiency of it after operation.

However, the extensive distribution of mitral commissurotomy in the treatment of combined mitral valve defects of the heart repudiates this position. In a number of cases, the associated aortic valve defect is not diagnosed before the operation, or there is no confidence of its presence.

Experience has shown that the elimination of mitral stenosis in the case of a combined mitral-aortic valve defect not uncommonly considerably improves the patient's condition. This causes us to solve the problem of the indications for mitral commissurotomy in a differentiated manner in such cases.

According to the data of Wiggers, a circulatory disturbance occurs when the aortic opening is narrowed by 60-70 percent. Before occurrence of this critical point the defect does not affect the minute volume of the heart and is compensated by the left ventricle. Narrowing of the aortic opening by 15-30 percent, giving a typical auscultatory picture of a valve defect, changes on the electrocardiogram, X-ray changes and other data, does not produce any serious hemodynamic disturbances (Wiggers). In the case of an association of a mitral and aortic stenosis, where the latter is only slightly expressed, that is, narrowing of the aortic opening does not reach the "critical" degree,

considerable compensatory possibilities of the left ventricle are not used. The minute volume of the heart is reduced because of the inadequate influx of blood into the left ventricle, and the entire weight of compensation for the pumping function of the heart rests on its weaker divisions--the right ventricle and the left atrium. Just mitral commissurotomy alone in such patients shifts the center of gravity of the compensation to the left ventricle, which has considerable compensatory capacities, which through its intensified work overcomes the "aortic barrier", or "third barrier" in the case of a mitral-aortic valve defect.

We find confirmation of this conception in the analysis of clinical experience. A reliable diagnosis of combined mitral and aortic valve defect has become possible only after the introduction of the method of operative diagnosis of the aortic valve defect into practice, by means of palpation of the root of the aorta. The root of the aorta is palpated directly over its valves with the index finger in the transverse sinus of the pericardium. In the case of aortic stenosis a systolic thrill is felt over the aorta; in the case of a pronounced valvular insufficiency a diastolic component to the thrill is also felt. In some cases, we succeeded in exposing the ascending aorta by making a pericardial incision in its upper portion anterior to the

phrenic nerve and recording the murmurs from it by means of a method of direct phonocardiography which we had developed. This method consists of the recording of murmurs from the exposed heart and large vessels through a microphone to which a detachable stethoscope with a sterilizable tube is attached.

At 250 operations of mitral commissurotomy performed during the past one and a half years the combination of the mitral valve defect with the predominance of stenosis and of an aortic valve defect with predominance of stenosis of the opening of the aorta was encountered 26 times. In 12 patients the aortic valve defect was not recognized before the operation; in 16 patients with combined mitral-aortic valve defects mitral commissurotomy gave excellent and good results.

As an illustration we are presenting a case history.

Patient K., age 27, was admitted to the hospital surgical clinic 12, March, 1958 with complaints of dyspnea on the slightest physical exertion, palpitation and pains in the cardiac region radiating to the interscapular area.

The patient had a history of frequent sore throats. The cardiac valve defect was found in 1953. Beginning with this time, the patient was treated repeatedly in the hospital in connection with decompensation, which was manifested in an increase in dyspnea, pedaledema and an enlargement of the

liver. Beginning with 1954, hemoptysis occurred repeatedly. Beginning with 1956, the patient had to observe a bed-rest regimen repeatedly, which in combination with therapeutic treatment improved her condition only slightly.

On objective examination the following were found: A moderate cyanosis of the lips, shortness of breath on walking, pastiness of the legs. The heart was dilated and enlarged upward. The left border of the heart was two centimetres outside the mid-clavicular line; the right border, 1.5 centimetres outside the right margin of the sternum; the upper border, at the second rib. The apical impulse was in the fifth intercostal space; a diastolic purring thrill was felt over it. On auscultation at the apex the first sound was slapping; there was a presystolic and a distinct systolic murmur. The systolic murmur radiated to the fifth point and to the base of the heart. Over the pulmonary artery there was an accentuation and doubling of the second sound.

The auscultatory data were confirmed by a phonogram; the interval from the Q to the first sound was 0.08 second. The blood pressure was 140/100 millimetres of mercury; the pulse was 80 beats a minute and rhythmical. On fluoroscopy and roentgenography the following were found: The lung roots were dilated. The heart had a mitral configuration with bulging of the arch of the pulmonary artery. On

examination in oblique positions an enlargement of the left atrium was noted with a displacement of the esophagus backward and to the right and an enlargement of both ventricles. On the electrocardiogram there was a sinus rhythm, displacement of the electrical axis to the right, a mitral type  $P_{1,2}$  wave; there were myocardial changes in the right ventricle. On roentgenelectrokymography a marked difficulty in evacuation of the left atrium was found; the regurgitation wave was hardly noticeable; the pulsation curve of the aorta and left ventricle was somewhat deformed. The blood and urine were normal.

On the basis of the examination a diagnosis of rheumatic combined mitral cardiac valve defect was made in the patient with a predominance of stenosis.

On 3 April 1958 a mitral commissurotomy was performed under intubation anesthesia. At the operation, on palpation of the aortic root a moderate systolic thrill was noted in the transverse sinus. The pulmonary artery was markedly dilated and tense. The mitral opening was 0.4 centimetre in diameter; there was a slight regurgitation which could be felt over the valve itself. At operation the mitral opening was dilated to 3.5-4 centimetres in diameter at both commissures. The postoperative course was smooth. The patient was discharged in good condition on the 29th day after operation.

She was examined after nine months. She offered no complaints; there was no dyspnea on walking or on physical work. She had gained 12 kilograms in weight; there was no edema; the liver was not enlarged. The pulse was 76 beats a minute and rhythmical. On auscultation the first sound was not increased; at the apex and over the base of the heart, in the second intercostal space on the right a systolic murmur was heard, and there was a slight accentuation of the second sound over the pulmonary artery which remained. The patient had married and was four months pregnant.

In analyzing the auscultatory and phonographic data in patients with mitral-aortic stenosis as before and after mitral commissurotomy we noted a change in the intensity of the systolic murmur over the aorta in seven persons. Apparently, a relationship exists between the diastolic filling of the left ventricle and the degree of stenosis of the opening of the aorta. When there is a definite reduction in the filling of the left ventricle as a result of mitral stenosis aortic stenosis does not express itself functionally, and no systolic murmur is heard over the aorta. After dilatation of the left venous opening and the increase in the diastolic filling of the left ventricle a larger quantity of blood begins to pass through the narrowed aortic opening in systole, which produces a greater vibration in



the area of the obstruction.

We should like to present a similar observation.

Patient Ye., age 30, was investigated in the hospital internal medical clinic, from where she was transferred 7 January 1959 to the hospital surgical clinic with the following diagnosis: Combined rheumatic mitral valve defect of the heart with a predominance of stenosis of the left venous opening. On examination in the surgical clinic the diagnosis was confirmed. Along with the "melody" of mitral stenosis a considerable systolic murmur was heard over the apex which radiated to the base of the heart; there was a displacement of the cardiac borders to the left and downward; the apex was found in the sixth intercostal space 1.5 centimetres outside the mid-clavicular line. On X-ray, a slight enlargement of the left ventricle was found. On electrocardiography there was a vertical position of the electrical axis of the heart.

These data were considered a manifestation of a slight associated mitral insufficiency.

On 28 January 1959 a mitral commissurotomy was performed; the mitral opening was dilated from 0.7 centimetre in diameter to 2.5-3 centimetres. The diastolic thrill which could be palpated previously over the apex disappeared. However, on palpation of the root of the aorta in the transverse sinus of the pericardium a pronounced systolic

thrill appeared which could hardly be found before the mitral commissurotomy. The postoperative course was smooth. A change in the auscultatory signs over the aorta was noted on the phonocardiogram, beginning with the second day after operation (Fig. 1). The patient was discharged on the 25th day after operation in a satisfactory condition.

Three months after the operation her condition was considerably improved, and no circulatory disturbances were found objectively.

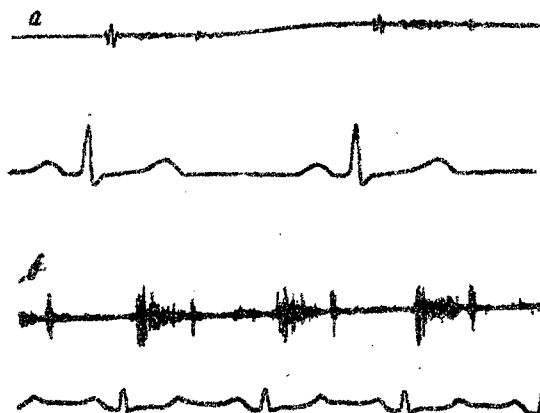


Fig. 1. Phonocardiogram Recorded from Second Interspace on the Right before (a) and after (b) Mitral Commissurotomy in Patient Ye. with Combined Mitral and Aortic Stenosis

In those cases where the associated aortic stenosis is pronounced mitral commissurotomy alone does not improve the patient's condition and can lead to the development of acute left ventricular insufficiency. Some idea of the degree of expression of the "third barrier" in combined

mitral-aortic stenosis can be obtained from the data of the clinic and by means of special investigation methods. However, the diagnosis offers great difficulties. The patient's complaints, typical of an aortic valve defect, may indicate a marked aortic stenosis: Pains in the cardiac region, dizziness. On objective examination, along with a picture of mitral stenosis, various degrees of enlargement of the left ventricle are found. On auscultation a pronounced systolic murmur is heard over the aorta, which is heard more distinctly at the jugular notch when the head is inclined slightly forward.

On phonographic examination the shape of the systolic murmur attract attention; at the apex and at the fifth point, in contrast to the murmur of mitral insufficiency, it does not begin immediately after the first sound but rather has a maximum oscillation amplitude in the middle of systole (Fig. 2). The interval between Q and the first sound, lengthening of which is typical of pronounced mitral stenosis, is not increased when there is an associated aortic valve defect.

The data of roentgenelectrokymography are of a certain value for the diagnosis of a mitral-aortic valve defect. The ascending systolic limb of the curve of aortic filling is distinguished by a more gentle slope than the normal. The angle of incline of the ascending limb of the curve

approaches the angle of incline of the descending limb (V.V. Zaretskiy). A smoothing out of the ventricular and atrial waves is noted on the curve of the left atrium, which indicates difficult evacuation of the left atrium (Fig. 3).

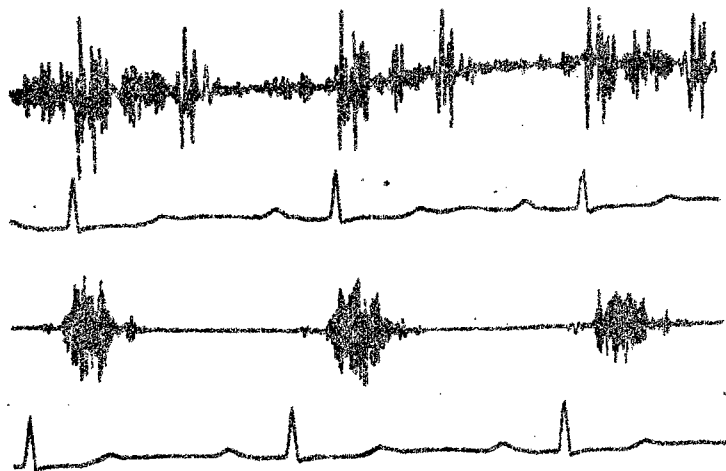


Fig. 2. Phonocardiogram Recorded at the Apex of the Heart in a Patient with Pronounced Mitral and Aortic Stenosis. The maximum of the systolic murmur is in the middle of systole.

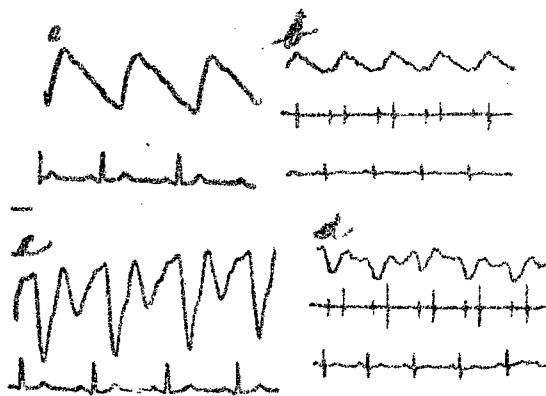


Fig. 3. Roentgenoelectrokymogram

Pulsation Curve of Aorta Normally (a) and in Mitral-Aortic Stenosis (b). Pulsation Curve of Left Atrium Normally (c) and in Mitral-Aortic Stenosis.

The right axis deviation of the heart in combination with auscultatory and roentgenelectrokymographic signs of aortic stenosis alone is evidence of a slight narrowing. According to our data, a normal or vertical electrical cardiac axis is characteristic of pronounced aortic stenosis in combination with mitral stenosis. The deviation of it to the left usually indicates a combination of a mitral valve defect (stenosis and insufficiency) with a pronounced aortic valve defect.

According to the surgical classification of mitral valve defect which has been proposed by Professor B.V. Petrovskiy the combination of the pronounced aortic stenosis with the mitral stenosis belongs to the fifth group. A simultaneous mitral-aortic commissurotomy, which was carried out in the clinic in the case of seven patients, is indicated for patients of this group.

The indications for mitral-aortic commissurotomy need to be checked and made more exact during the operation. With this aim in view, some surgeons perform a puncture of the left ventricle and aorta in order to determine the pressure gradient in them. A reduction of the pressure in the aorta by 30 millimetres of mercury or more compared with that in the left ventricle serves as an indication for aortic valvulotomy (S.A. Kolesnikov, Björk, Bailey).

As our experience has shown, with the performance of

such a pressure measurement in the left ventricle and aorta in patients with mitral-aortic stenosis, whom we referred to the first group in the surgical classification of mitral valve defects of B.V. Petrovskiy despite the presence of an independent murmur over the aorta in the form of fremitus of its walls over the valves, found during the operation, no pressure gradient was found in the left ventricle or aorta.

Mitral-aortic commissurotomy was performed in three patients by means of the left index finger through the left venous opening following a mitral valve commissurotomy and in four patients, by a transventricular instrumental aortic commissurotomy with subsequent mitral commissurotomy through the left auricular appendage. In addition, an aortic commissurotomy was performed in the case of pure stenosis in five patients.

For the purpose of measuring the pressure gradient in the left ventricle and aorta we tried out and can recommend both the puncture and the "bloodless" method, which consists of passing an elastic catheter for catheterization of cardiac cavities along the finger which has already been introduced into the left atrium through the left auricular appendage for mitral commissurotomy and later into the left ventricle. A serial recording is made of the pressure in the left ventricle and left atrium. The pressure in the

aorta may be judged on the basis of a measurement of the arterial pressure by the Korotkov method in the brachial artery with a correction of 5-7 millimetres of mercury. The latter method of measuring the intracardiac pressure is better in those cases where aortic commissurotomy is done with the finger following a dilatation of the mitral opening through the left venous opening. However, this operation offers considerable technical difficulties and is not available to all surgeons. A long enough finger is required for it, and in the case of gross subvalvular changes--adherent papillary muscles, chords and leaflets of the mitral valve--the possibility of accomplishing it is, at times, doubtful. The transventricular aortic instrumental valvulotomy is more effective, but it, according to the data of a number of authors (S.A. Kolesnikov and G.I. Tsukerman, Ye.N. Meshalkin, Litwak and others), is frequently complicated by aortic insufficiency, because the blind tear is not uncommonly made through the valve leaflets rather than through the commissures. From this viewpoint the operation on the aortic valves under direct visual observation is more efficient. Such an operation has been performed on two patients in the clinic. However, at the present time, these operations have not been adequately developed and are more complicated.

### Conclusions

1. In determining the indications for surgical treatment of patients with combined mitral-aortic valve defect slight and pronounced stenosis of the aortic opening should be distinguished; these belong to different surgical classification groups in mitral valve defects according to B.V. Petrovskiy and require different types of operative procedures.
2. In the case of combined mitral-aortic stenoses with a slight narrowing of the aortic opening a mitral commissurotomy is indicated, which gives good results.
3. Simultaneous elimination of the mitral and aortic stenosis is indicated only for marked degrees of the latter.
4. For the purpose of determining the indications for mitral-aortic commissurotomy measurement of the pressure gradient in the left ventricle and aorta is needed during the operation.

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Received 1 July 1959

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